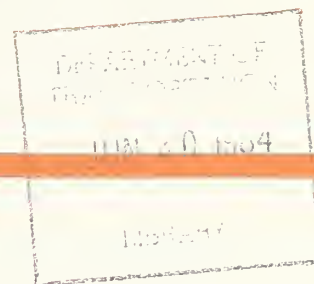


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Pedestrian Safety



**A REPORT OF THE
TRANSPORTATION TASK FORCE
OF THE**

URBAN
CONSORTIUM
FOR TECHNOLOGY INITIATIVES

Supported by



**U.S. DEPARTMENT OF TRANSPORTATION
Washington, D.C. 20590
SEPTEMBER 1980**

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES

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The Urban Consortium for Technology Initiatives was formed to pursue technological solutions to pressing urban problems. The Urban Consortium is a coalition of 37 major urban governments, 28 cities and 9 counties, with populations over 500,000. These 37 governments represent over 20% of the nation's population and have a combined purchasing power of over \$25 billion.

Formed in 1974, the Urban Consortium represents a unified local government market for new technologies. The Consortium is organized to encourage public and private investment to develop new products or systems which will improve delivery of local public services and provide cost-effective solutions to urban problems. The Consortium also serves as a clearinghouse in the coordination and application of existing technology and information.

To achieve its goal, the Urban Consortium identifies the common needs of its members, establishes priorities, stimulates investment from Federal, private and other sources and then provides on-site technical assistance to assure that solutions will be applied. The work of the Consortium is focused through 10 task forces: Community and Economic Development; Criminal Justice; Environmental Services; Energy; Fire Safety and Disaster Preparedness; Health; Human Resources; Management, Finance and Personnel; Public Works and Public Utilities; and Transportation.

Public Technology, Inc. is the applied science and technology organization of the National League of Cities and the International City Management Association. It is a nonprofit, tax-exempt, public interest organization established in December 1971 by local governments and their public interest groups. Its purpose is to help local governments improve services and cut costs through practical use of applied science and technology. PTI sponsors the nation's largest local government cooperative research, development, and technology transfer program.

PTI's Board of Directors consists of the executive directors of the International City Management Association and the National League of Cities, plus city managers and elected officials from across the United States.



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Pedestrian Safety



September 1980

Prepared by

**PUBLIC TECHNOLOGY, INC.
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Washington, D.C. 20036**

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to the**

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES



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PREFACE

This is one of ten bulletins in the fourth series of Information Bulletins produced by the Transportation Task Force of the Urban Consortium for Technology Initiatives. Each bulletin in this series addresses a priority transportation need identified by member jurisdictions of the Urban Consortium. The bulletins are prepared for the Transportation Task Force by the staff of Public Technology, Inc. and its consultants. In 1980, Transportation of Hazardous Materials was identified as a priority need by both the Transportation and the Fire Safety and Disaster Preparedness Task Forces of the Urban Consortium. The Information Bulletin addressing that need was prepared under their joint direction.

Nine newly identified transportation needs are covered in this fourth series of Information Bulletins:

- Economic Impacts of Transportation Restrictions
- Parking and Traffic Enforcement
- Pedestrian Traffic Safety
- School Bus Use for Non-School Transportation
- Street Management Information Systems
- Taxicabs as Public Transit
- Transportation Construction Management
- Transportation of Hazardous Materials
- Transportation System Management, Air Quality, and Energy Conservation

One Information Bulletin covering a need identified in 1979 is being updated and expanded:

- Transportation Energy Contingency Planning

The needs highlighted by Information Bulletins are selected in an annual process of needs identification used by the Urban Consortium. By focusing on the priority needs of member jurisdictions, the Consortium assures that resultant research and development efforts are responsive to local government problems.

Each bulletin provides a nontechnical overview, from the local government perspective, of issues and problems associated with each need. Current research efforts and approaches to the problem are identified. The bulletins are not an in-depth review of the state-of-the-art or the state-of-the-practice. Rather, they serve to identify and raise issues and as an information base from which the Transportation Task Force selects topics that require a more substantial research effort.

The Information Bulletins are also useful to those, such as elected officials, for whom transportation is but one of many areas of concern.

The needs selection process used by the Urban Consortium is effective. Priority needs selections have been addressed by subsequent Transportation Task Force projects:

- Five Transit Actions regional meetings were held between January 1979 and May 1979 to address the need for Transit System Productivity. The product of these meetings is a Transit Actions Workbook that features techniques currently being used to improve transit system performance and productivity.
- To facilitate the provision of Transportation for Elderly and Handicapped Persons, five documents were developed: one on local government approaches, a planning checklist, an information sourcebook, a series of case studies, and a chief executive's summary.
- To help improve Center City Circulation, two new projects have been completed. Center City Environment and Circulation: Transportation Innovations in Five European Cities is the second of three volumes showing how cities use transportation and pedestrian improvements to help downtown revitalization. Another project, addressing the coordination of public transportation investments with real estate development culminated in a national conference--the second Joint Development Marketplace in Washington, D.C., in June 1980. The Marketplace was attended by over 500 persons, including exhibitors from cities and counties around the country and representatives of private development and financial organizations.
- A series of documents relating to the need for Transportation Planning and Impact Forecasting Tools has been prepared: (1) a management-level document for local officials describing manual and computer transportation planning tools available from the U.S. Department of Transportation, (2) a series of case studies of local government and transit agency applications of these tools, and (3) a guide describing ways local governments can gain access to these tools. Additional documents are being prepared on how local governments can use U.S. Census information more effectively through these U.S. Department of Transportation computer tools.

- To help meet the need to Accelerate Implementation Procedures, a conference on the Federal-Aid Urban System (FAUS) was held in Baltimore, Maryland, in May 1980, for Federal Highway Region 3. The conference was aimed at developing communication between local, State, and Federal officials to improve implementation of and clear up misunderstandings about the FAUS program.
- To meet the need to promote use of Transportation System Management (TSM) measures, a series of five regional meetings are being held in 1980 to provide local, State, and Federal officials, and representatives of transit agencies and the business community with the opportunity to exchange information about low-cost TSM projects to improve existing transportation systems.
- To facilitate the dissemination of information on local experiences in Parking Management, a technical report describing the state-of-the-art is being prepared.
- A National Transit Pricing Forum was held at Virginia Beach, Virginia, in March 1979 to address the need for more information on Innovative Fares. Much of the Forum was directed to technical advances in areas of pricing research and practice. The proceedings of this conference are available.
- Two projects were undertaken to pursue the need for Taxicabs for Public Transportation. A handbook, Taxicabs and Federal Programs, was prepared, and five regional meetings were held in March and April of 1980. In May 1980 the Transportation Task Force sponsored the National Conference on Taxicab Innovations: Service and Regulations.

Ongoing Task Force Information Dissemination and Technology Sharing needs are currently addressed by a series of SMD Briefs. These one-page reports provide up-to-date information about on-going UMTA Office of Service and Methods Demonstrations projects. In addition, the SMD HOST Program allows transportation officials from selected jurisdictions to visit one of these projects for on-site training.

Additional Technology Sharing occurs through the National Cooperative Transit Research Program (NCTRP) which was organized jointly by Public Technology, Inc., the American Public Transit Association, the Urban Mass Transportation Administration, and the Transportation Research Board to address problems relating to public transportation identified by local and state government and transit administrators.

The support of the U.S. Department of Transportation's Technology Sharing Division in the Office of the Secretary, Federal Highway Administration, National Highway Traffic Safety Administration, and Urban Mass Transportation Administration has been invaluable in the work of the Transportation Task Force of the Urban Consortium and the Public Technology, Inc. staff. The guidance offered by the Task Force members will continue to ensure that the work of the staff will meet the urgent needs identified by members of the Urban Consortium for Technology Initiatives.

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Table of Contents

<u>Chapter</u>		<u>Page</u>
1	ISSUES AND PROBLEMS	1
	Accident Types	3
	Countermeasures	4
	Planning for Pedestrians	10
	Pedestrian Safety Programs and Plans	11
	Federal Funding Sources for Pedestrian Safety	13
2	CONTACTS AND CURRENT PROGRAMS	15
	Contacts--Federal Agencies	15
	Federal Programs	17
	Local Programs and Contacts	20
	Other Programs	22
3	ANNOTATED BIBLIOGRAPHY	23
	APPENDIX--FEDERAL FUNDING SOURCES	31
	FOR PEDESTRIAN SAFETY PROGRAMS	
	Federal Highway Administration	31
	Federal Highway Administration and National	
	Highway Traffic Safety Administration	38

List of Tables

<u>Table</u>		<u>Page</u>
1	Pedestrian Fatalities as a Percentage of Total Motor Vehicle Fatalities--18 Largest U.S. Cities	2
2	Governor's Highway Safety Representatives	39
3	FHWA Regional Offices	44

Chapter 1

ISSUES AND PROBLEMS

Everyone is a pedestrian at some time or other.¹ Despite this universality, pedestrian traffic safety remains an unresolved issue and pedestrian fatalities represent 16% of all motor vehicle fatalities. Although walking is the most frequently used transportation mode, it has in the past been a low priority consideration in the design of the nation's transportation system. Consequently, competition between vehicles and pedestrians continues to result in pedestrian accidents, deaths, and injuries.

In 1979, 8,090 pedestrian fatalities occurred in the United States. Urban areas accounted for 65% of the fatalities and 85% of the injury accidents involving pedestrians.² In many large cities pedestrian fatalities account for over one-third of the total motor vehicle fatalities within the city. Table 1 shows the percentage of pedestrian fatalities as part of the total number of motor vehicle fatalities for the 18 largest U.S. cities.

Pedestrian safety programs vary between jurisdictions in organization and emphasis. Some cities have a pedestrian safety advocate--one person whose sole responsibility is the pedestrian safety program in that city. In other cities, an entire department (Police or Transportation, for example) has responsibility for the program.

Approaches to the basic issue of pedestrian safety also range widely--from separating pedestrians completely from vehicle traffic, through educating and encouraging pedestrians to obey safety laws, to making drivers aware of actions they can take to reduce pedestrian accidents.

The common problem, however, is how best to reduce the pedestrian accident rate. This Information Bulletin addresses the following areas:

- Common types of pedestrian accidents.
- Basic countermeasures.
- Planning for pedestrians.
- Pedestrian safety programs.
- Federal funding for pedestrian safety programs.

¹A pedestrian is defined here as one who walks, stands, runs, walks with a bicycle, or crosses a roadway on roller skates, a skateboard, a toy vehicle, or in a wheelchair.

²National Highway Traffic Safety Administration, Motor Vehicle Safety - Report to the Congress, 1979.

Table 1

PEDESTRIAN FATALITIES AS A PERCENTAGE OF TOTAL MOTOR VEHICLE FATALITIES
18 LARGEST U.S. CITIES

(1975 - 1978)

CITY	1975-1978 AVERAGE PERCENTAGE OF PEDESTRIAN FATALITIES TO TOTAL MOTOR VEHICLE FATALITIES	CITY	1975-1978 AVERAGE PERCENTAGE OF PEDESTRIAN FATALITIES TO TOTAL MOTOR VEHICLE FATALITIES
New York	52.5	San Antonio	25.1
Chicago	39.6	Phoenix	31.7
Los Angeles	30.5	Indianapolis	19.9
Philadelphia	46.0	San Francisco	48.8
Houston	27.1	Memphis	28.4
Detroit	39.3	Washington, D.C.	48.7
Dallas	23.0	Milwaukee	33.7
San Diego	24.6	San Jose	24.9
Baltimore	45.5	Cleveland	34.9

Source: National Highway Traffic Safety Administration

ACCIDENT TYPES

The National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA) have classified pedestrian accidents into over 30 types. One-half of all pedestrian fatalities occur after the pedestrian has violated a traffic law or committed some other unsafe act. Pedestrians under age 15 or over age 64 account for one-half of pedestrian fatalities. The following 7 types account nationally for 60% of all pedestrian accidents.³

- **Dartout (33%)**
The person appears in the roadway suddenly, usually from between parked cars or from behind another obstruction. The accident typically occurs in residential neighborhoods away from an intersection. The most frequent victims are children of preschool and elementary school age.
- **Intersection Dash (8%)**
This accident type is similar to the dartout except that it occurs at an intersection. It usually occurs in a non-residential area. All age groups are involved, with 5-9 year olds predominating.
- **Vehicle Turn or Merge (6%)**
A driver turning or merging into traffic has his attention on oncoming traffic and fails to see a pedestrian approaching from a different direction. This type of accident almost always occurs at intersections in nonresidential neighborhoods. Fifty percent of the victims are over 45 years of age.
- **Multiple Threat (3%)**
The driver of a vehicle in one lane stops to let a pedestrian cross as a second vehicle going in the same direction approaches in an adjacent lane. The pedestrian cannot be seen by the second driver because the first vehicle blocks his line of sight, and the pedestrian cannot see the approaching vehicle because his vision is also blocked by the first vehicle. The pedestrian is struck after stepping out from in front of the stopped vehicle. This type of accident occurs mostly at intersections, in commercial areas, in marked crosswalks, and during the day.
- **Bus Stop Related (3%)**
The pedestrian is struck by a vehicle while crossing in front of a bus stopped at a bus stop. These accidents almost always occur at intersections in nonresidential areas.
- **Vendor (2%)**
A person is struck by a vehicle while going to or from a street vendor's vehicle. This type of accident usually occurs in residential areas and not at an intersection. The victims are almost invariably children under 14 years of age.

³National Highway Traffic Safety Administration, Pedestrian Safety Program Memorandum (Washington, D.C.: U.S. DOT, 1976).

- Backing up (2%)

A pedestrian is struck by a vehicle that is backing up. Neither the pedestrian nor the driver is aware of the need for evasive action. This type of accident occurs mainly in commercial or mixed use commercial-residential areas at or near an intersection.

Some other common types of pedestrian accidents occur when a person is--

- Standing in the roadway waiting to cross.
- Getting out of a vehicle.
- Working on a vehicle.
- Working on or near a roadway.
- Crossing a freeway.
- Walking in a parking lot.

COUNTERMEASURES

Separating pedestrian accidents into accident types provides a basis for developing countermeasures designed to fit specific problems and particular population groups. Countermeasures may --

- Reduce or eliminate predisposing factors--such as parked cars that can prevent adequate detection of pedestrians and oncoming vehicles.
- Reduce or eliminate function or event sequence failures--for example, by teaching pedestrians the proper way to look for oncoming vehicles and drivers how to detect possible dartouts.

Countermeasures for reducing pedestrian accidents can be categorized into five basic types. They are (1) child protection, (2) education of pedestrians, especially children and elderly persons, (3) enforcement, (4) regulations, and (5) engineering and physical measures.

Child Protection

Approximately 50% of all dartout accidents involve children from five to nine years old. General child protection measures include providing play areas or play streets, supervising children's outdoor activities, improving the visibility of the child, warning drivers of the presence of children, regulating vehicle speed, identifying safe walking routes to schools, providing school crossing guards, identifying safe school bus routing, selecting school sites carefully, and prohibiting parking in areas where children play and walk. (New York City, Philadelphia, and other cities block off selected streets at certain times of the day during the summer or after a snow storm to be used for play.)

The Federal Highway Administration (FHWA) has developed guidelines for the protection of children from 5 to 14 years of age, walking to and from school, entering and leaving school buses, and at neighborhood playgrounds. These guidelines, published in a seven volume report titled School Trip Safety and Urban Play Areas, include the development of safe route maps for the school walking trip, planning school bus routing and scheduling, and the creation and operation of urban play streets.⁴

Pedestrian Education Programs

Pedestrian education programs can be targeted toward specific age groups:

- Preschool children--Guidance can be provided by parent or nursery school personnel and other persons. Educational tools such as games, television, and toys may be used.
- Elementary school children--Pedestrian safety can be addressed in programs using speakers, films, contests and games, and classroom instruction. There also can be programs to instruct parents and teachers.
- Junior and senior high school students--Pedestrian safety can be taught as part of driver education. Assemblies, films, and speakers on pedestrian safety can be arranged. It might be possible to develop a youth traffic court to enforce pedestrian and bicycling regulations on school grounds and at school crossings.
- General public--Talks by members of the police force to civic and community action groups and the use of mass media can inform the public of the pedestrian accident problem. Public service announcements are being used in Nashville and Dade County as part of their pedestrian safety campaigns.
- Elderly person--Safety courses and talks to senior citizen groups can help elderly persons become more aware of their risks as pedestrians.

The National Highway Traffic Safety Administration has developed the "Willie Whistle Safe-Street Crossing" in-school training program for children from kindergarten through third grade to reduce the occurrence of dartout accidents. The program uses films, discussion, games, and outside instruction to teach children to stop at the traffic lane and search correctly before entering the roadway. Participants have shown significant improvement in looking in both directions before crossing or entering the street. Accident reduction results are positive, but not conclusive. This program is being tested in Dade County as part of a comprehensive pedestrian safety demonstration project.

⁴Throughout this Information Bulletin, training manuals, training sessions, public relations materials, and educational materials are discussed. The persons or agencies from which the materials and program information can be obtained are listed in the Federal Programs section beginning on page 17.

The National Highway Traffic Safety Administration has also developed pedestrian safety messages for television and radio based on several types of urban pedestrian accidents including multiple threat, vehicle turn or merge, intersection dash, and dartout accidents. The messages are still being tested.

Enforcement

Enforcement measures, usually involving the issuance of traffic citations to jaywalkers and those who violate official signs and signals designed to control pedestrian movements, have been largely ineffective.⁵ In many cities enforcement is considered to be one of the most important pedestrian countermeasures, but there is no quantitative data showing the effect of enforcement on pedestrian accidents.

When pedestrians view laws as restrictions on their movement, they often violate the laws. Enforcement campaigns can substantially reduce unlawful behavior, but the effects are short-lived and must be periodically reinforced. While an enforcement campaign is going on, pedestrians will be more cautious in the area where the enforcement is taking place. Once the enforcement stops, many pedestrians, including those who were reprimanded or ticketed, will resume their old habits.

Many motorists are not familiar with pedestrian rights and laws. For a pedestrian's rights to be meaningful, motorists must be aware of and respect these rights. This requires educating and informing both the new driver through driver education courses and the experienced motorist through public service announcements and other media means. An enforcement campaign should ticket not only pedestrian violators, but also motorists who violate pedestrian rights. Washington, D.C. has developed a pedestrian enforcement program for violations by both vehicles and pedestrians. Locations with a high rate of pedestrian accidents are patrolled during peak accident times. Denver has also developed an enforcement program that requires ticketed pedestrians either to pay a fine or to attend a two hour pedestrian safety school.

Regulations

In an effort to reduce selected accident types, the National Highway Traffic Safety Administration has developed nine model pedestrian safety ordinances. The following have been or will be tested and evaluated.

- Model ice cream truck ordinance--This ordinance requires vehicles to come to a full stop when approaching a vending ice cream truck before proceeding cautiously. The ice cream truck must be equipped with a stop signal arm and flashing lights in the front and rear and vend only when legally parked. This ordinance produced a 77% reduction in accidents when tested in Detroit, and

⁵Ronald R. Braun and Marc F. Rodin, Quantifying the Benefits of Separating Pedestrians and Vehicles (Washington, D.C.: Transportation Research Board, 1978).

New Jersey has just enacted it. The regulation was based on the successful experience of Indianapolis, which adopted such an ordinance in 1971.

- Multiple vehicle overtaking ordinance--This ordinance requires drivers to yield to pedestrians in crosswalks and not to pass a vehicle stopped at a crosswalk without stopping first. It has not yet been tested.
- Model bus stop ordinance--This ordinance requires bus stops to be located at the far side of an intersection and prohibits pedestrians from crossing in front of a stopped bus, unless they are permitted to do so by a traffic control device or at the direction of a police officer.
- Disabled vehicle ordinance--This ordinance requires the driver of a vehicle that is disabled on a freeway to get the vehicle as far off the road as possible and to place warning devices behind the vehicle. It requires reflective material to be carried in motor vehicles and to be worn by individuals walking along controlled access highways, limits walking and standing on such highways, and prohibits standing in the roadway while repairing a disabled vehicle.

The other model ordinances are:

- Model road work site ordinance.
- Model ordinance on parking near intersections and crosswalks.
- Model backing signal ordinance.
- Model on-street parking ordinance.

Engineering and Physical Measures

In a joint FHWA-NHTSA study, specific pedestrian behaviors were associated with the various types of urban accidents. These associations served as a basis for evaluating accident countermeasures that gave the most promise of reducing accidents.⁶ The countermeasures evaluated included:

- Pedestrian midblock crossing barriers. These are used at locations where a significant number of pedestrian accidents result from midblock crossings. Physical barriers along the curb or in the median channelize crossings to intersections.
- Midblock crosswalks. Midblock crossings are generally more hazardous than intersection crosswalks, but under certain conditions a marked crosswalk midblock between widely spaced intersections can help reduce pedestrian accidents. For example, if there is a parking lot on one side of the street and a pedestrian trip generator on the other side, a midblock crosswalk can be beneficial.

⁶W.G. Berger and R.L. Knoblauch, Urban Pedestrian Accident Countermeasure Evaluation.

- Diagonal on-street parking. While diagonal parking on main streets creates a potentially hazardous opportunity for collisions between motor vehicles, in terms of pedestrian accidents it is safer than parallel parking because it reduces the potential for dartout accidents. It is not recommended for main streets unless there is ample width to allow backing without interfering with traffic flow, but it may be appropriate in residential areas depending on local conditions.
- Stop-line relocation. Moving the vehicle stop-line several feet back from pedestrian crosswalks can reduce pedestrian accidents at intersections by providing more time and space for vehicles to stop when pedestrians suddenly dart into the intersection.
- Far-side bus stop. This reduces accidents that occur when a pedestrian crosses the street in front of a bus that is stopped and then is struck by an oncoming vehicle as he steps into the next lane. It also reduces accidents caused when a vehicle making a right turn in front of a bus in a parallel lane is struck as the bus moves forward.

Other Planning and Engineering Measures

A number of planning and engineering measures may in some cases function as effective countermeasures, but under certain conditions these measures may have an adverse impact on pedestrian safety.

- Marked or unmarked crosswalks. Unjustified marked crosswalks have shown higher accident rates than unmarked crosswalks. They present an illusion of safety, and a large number of crosswalks increases motorist noncompliance. A government study in Germany,⁷ has shown that zebra crossings (diagonal stripe crosswalks) pose as great a danger to pedestrians as unmarked crossings. Drivers do not pay proper attention to the markings while pedestrians have a false sense of security while using the marked crosswalk. Until the German government's guidelines are revised, local units of government will permit zebra crossings only where there are traffic lights or in locations that are brightly lit at night.
- Grade separation. This includes pedestrian overpasses, underpasses, and extensive underground walkways. High use of such grade separations will not be achieved unless it is made inconvenient or impossible for pedestrians to cross at road level.
- Lighting. Since over 35% of pedestrian accidents occur during darkness, adequate street or crosswalk lighting can reduce pedestrian deaths by almost one half.⁸

⁷G. Wynne, Ed., Urban Transportation Abroad, (Council for International Urban Liaison, Spring 1980), p. 7.

⁸M. Freeman et al, Fixed Illumination for Pedestrian Protection.

- One-way streets. These can reduce pedestrian accidents by improving drivers' fields of vision and requiring pedestrians to look in only one direction. Research has shown that on one-way street networks, pedestrians crossing at intersection crosswalks were hit twice as often by vehicles making left turns on green as by vehicles making right turns on green.⁹ Some of the factors involved in this accident type are lighting, visibility limitations caused by a vehicle's roof-support pillars, driver habits, and signal placement.
- Retroreflective materials. The use of reflective or retroreflective materials on outer clothing provides greater visibility of pedestrians at night.
- Safety islands. They provide refuge on wide roads for pedestrians who are unable to cross during a single walk signal.
- Sidewalks. They may eliminate accidents involving pedestrians who might otherwise be walking, standing, or playing in the roadway. While sidewalks serve an important function, in many areas they are missing, discontinuous, or unsuitable for pedestrian use. In some localities, sidewalks are viewed as a luxury rather than a necessity.
- Signalization. Traffic and pedestrian signals may provide safer crossing areas for pedestrians by stopping traffic and informing pedestrians when it is safe to cross. The effectiveness of signals in increasing pedestrian safety in crossing areas is being examined. However, many pedestrians are not sure of the exact meaning of pedestrian signals or disobey the warnings. Signal timing to accommodate both pedestrian and vehicle traffic can cause inconvenience and delay to both. When the left turn phase of a traffic signal coincides with the walk signal, pedestrians are given an undue illusion of safety. The advent of right-turn-on-red has complicated the crossing situation for pedestrians and may also give an undue sense of safety. A study completed recently by the Insurance Institute for Highway Safety indicates that traffic accidents have increased as the result of right-turn-on-red. Accidents involving a vehicle and pedestrian increased by 59 percent overall and by 79 percent in urban areas. A 30 percent increase was experienced for accidents involving children and 110 percent increase for those involving elderly pedestrians.¹⁰
- Signs and markings. These alert pedestrians and motorists to unexpected hazardous conditions such as children's play areas and school crossings, and tell pedestrians and motorists what they may and may not do--for example, signs prohibiting pedestrians on freeways.

⁹Phillip A. Habib, Analysis of Pedestrian Crosswalk Safety on One-Way Street Networks.

¹⁰Paul Zador, Adoption of Right Turn on Red: Effects on Crashes at Signalized Intersections, p. 1.

PLANNING FOR PEDESTRIANS

The concept of pedestrian safety in many instances is based on the philosophy of saving the pedestrian from himself--in other words preventing the pedestrian from confronting the automobile rather than vice versa. This philosophy favors the automobile over the pedestrian by blocking or maneuvering pedestrians into what is deemed acceptable behavior through the use of signals, signs, markings, and barriers.

Pedestrian movement and safety can be considered a high priority in a city's transportation plan, especially in the downtown core activity area. This approach has been taken in many cities where pedestrian malls and walkways and auto-restricted zones have been developed. Some examples include:

- Minneapolis' Nicollet Mall and Skyway System--the mall is an eight block pedestrian and transit mall on a major retail street. Minneapolis also has one of the nation's most extensive skyway systems with eighteen glass enclosed, climate controlled passages connecting the second stories of downtown buildings.
- Boston's Downtown Crossing--the crossing is an auto-restricted zone in the older downtown retail area and includes a mixture of bus and pedestrian-only streets, pedestrian amenities, and transit facilities.
- San Antonio's Paseo del Rio--a below grade walkway system encircles the heart of downtown San Antonio along the river bank adjacent to the hotel, retail, and commercial activity center of the City. Flood control measures on the San Antonio River had to be taken before the walkway system could be developed.

Improvements such as these not only create a safer pedestrian environment, but often benefit the community and central business district. Benefits may include commercial revitalization, improved transit service, decreased automobile congestion, and decreased air and noise pollution.

Careful planning of the spatial arrangements of activity centers and traffic patterns can also reduce pedestrian accidents and improve safety. Conversely, lack of planning can create situations in which pedestrian accidents are likely to occur--for example a senior citizens' center located across the street from housing for the elderly or a parking lot across the street from the facility it serves. The Federal Highway Administration has prepared a three volume report, A Pedestrian Planning Procedures Manual, that provides guidelines for planning pedestrian movement in central business districts and multi-use areas. The Manual addresses the design of comprehensive pedestrian networks and individual pedestrian facilities.

PEDESTRIAN SAFETY PROGRAMS AND PLANS

Under the authority of the Highway Safety Act of 1966, the U.S. Department of Transportation issued 18 Highway Safety Program Standards. Standard 14, Pedestrian Safety, is administered jointly by NHTSA and FHWA. The Standard requires that each State develop and implement a Pedestrian Safety program providing at a minimum:

- An inventory of pedestrian-motor vehicle accidents.
- Procedures for improving the protection of pedestrians through reduction of potential conflicts with vehicles.
- A program for familiarizing drivers with the pedestrian problem and ways to avoid pedestrian collisions.
- Programs for training and educating all members of the public as to safe pedestrian behavior on or near streets and highways.
- A program for the protection of children walking to and from school, entering and leaving school buses, and in neighborhood play.
- A program for establishment and enforcement of traffic safety regulations designed to achieve orderly pedestrian and vehicle movement and to reduce vehicle-pedestrian conflicts.¹¹

These elements can also be included in pedestrian safety programs developed by local governments. Such programs can be developed through plans that include elements such as:

- Program goals and objectives.
- An analysis of the inventory of pedestrian-motor vehicle and non-motor vehicle accidents.
- An analysis of the needs of special pedestrian groups such as young children, elderly and handicapped persons.
- An analysis of existing pedestrian safety programs and efforts.
- Program recommendations and program priorities.
- An implementation plan and schedule.
- An analysis of capital and operating costs.
- List of funding sources.

¹¹U.S. Department of Transportation, Highway Safety Program Standards, 1974.

The plan should also address the need to incorporate pedestrian safety considerations in other plans or planning decisions, such as land use and circulation plans, and site planning and zoning decisions.

Pedestrian safety programs can be initiated, organized, and implemented at the local level. NHTSA's Action Guide suggests that a successful program should include:

- Interdisciplinary teamwork between school system representatives, traffic engineers, police, citizens, media, and planners.
- A single community agency or coordinator having primary administrative authority for the program.
- Strong support for the program from the mayor, city council, and other public officials.
- Community involvement.
- A continuing, long term effort.¹²

The political support of high ranking elected officials can be particularly important to a program's success. It is also important to assign administrative responsibility for the program to an experienced high level staff person.

Local pedestrian safety programs vary widely in organization and emphasis. Washington, D.C. and Nashville each have a pedestrian safety advocate--one person whose sole responsibility is the pedestrian safety program. In New York City the Department of Transportation has responsibility for pedestrian safety, while in Denver, the police department runs the program.

Presently many pedestrian safety education programs are directed almost entirely at children from kindergarten to sixth grade. This emphasis on youth education, however, is gradually changing. Other existing programs stress pedestrian education and restraint, and strict enforcement of regulations, rather than driver education. For examples of local government pedestrian safety programs, see pages 20-22 of this Information Bulletin.

¹²National Highway Traffic Safety Administration, Pedestrian Accident Reduction-An Action Guide for State and Local Programs (Draft).

¹³BioTechnology, Inc., Model Pedestrian Safety Program Users' Manual. 1978.

The Federal Highway Administration has developed a Model Pedestrian Safety Program User's Manual, designed to provide guidelines and be a resource tool for the development or improvement of local pedestrian safety programs.¹³ The Manual is intended for the use of those with limited experience in safety programs, as well as for those who are already engaged in such programs. It describes the steps involved in setting up a pedestrian safety program, discusses in detail possible solutions to particular safety problems, and provides extensive bibliographical resources. FHWA has contracts with four cities--New York, Baltimore, San Francisco, and Boulder--to apply the principles described in their User's Manual in developing a pedestrian safety program by analyzing existing situations and developing proposals for implementation.

FEDERAL FUNDING SOURCES FOR PEDESTRIAN SAFETY

Financial assistance programs relating to pedestrian safety and research are administered by the Federal Highway Administration and the National Highway Traffic Safety Administration. Federal-aid funds for Interstate, primary, secondary, and urban system highways can be used for the cost of planning, construction, and improvement of pedestrian facilities. The construction of pedestrian facilities including sidewalks and pathways, pedestrian traffic control devices, roadway lighting for pedestrian safety, and other special pedestrian facilities are eligible for Federal-aid highway funding at the same matching ratio as the adjacent highway. Federal-aid funds may, under certain circumstances, be used off-system for pedestrian facilities that are not a part of highway projects.

Funding is also available from safety programs for projects to increase pedestrian safety. The Safer Off-System Roads program provides funds to improve safety, such as correcting high hazard locations for roads not on a Federal-aid highway system. The Hazard Elimination Program provides funding for a similar purpose for high hazard locations on the Federal-aid system. The Pavement Marking Demonstration program provides funds to demonstrate the value of pavement markings in providing greater vehicle and pedestrian safety on any paved public highway.

The Federally coordinated program of research and development can fund studies designed to increase the effectiveness of highway safety programs. Highway safety grants can be used for accident data collection and analysis, public information activities, planning and evaluation of pedestrian related facilities, and other activities identified in Highway Safety Program Standard 14 on pedestrian safety. Highway safety research and development funds can be used for such activities as training or educating highway safety personnel, research fellowships in highway safety, and highway safety research.

A fuller description of these and other Federally funded programs is contained in the Appendix of this Information Bulletin.

Chapter 2

CONTACTS AND CURRENT PROGRAMS

CONTACTS--FEDERAL AGENCIES

The National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA) share joint responsibility for administering Federal programs in pedestrian safety. NHTSA is concerned with pedestrian and driver education programs and research on pedestrian accidents, and FHWA is responsible for the road engineering and planning aspects of pedestrian safety. Programs under these two agencies involve analysis of data on pedestrian accidents to identify typical accident components, design and testing of countermeasures, development of program guidelines for State and local administration of pedestrian and bicyclist safety, and funding of pedestrian safety engineering projects as integral elements of Federal-aid highway construction and traffic engineering programs. Department of Transportation Headquarters is located at:

- Nassif Building
400 7th Street, S.W.
Washington, D.C. 20590

The code number following each contact name is essential for identification and should be used in all written correspondence.

Federal Highway Administration

- Office of Traffic Operations
Traffic Control Systems Division
Concerned with signs, markings, signals, and lighting.
Contact: Robert E. Connor
Chief, Traffic Control Systems Division
Office of Traffic Operations (HTO-20)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-0411

Traffic Performance and Programs Division
Concerned with traffic characteristics, human factors, and traffic regulations.
Contact: John Hibbs
Office of Traffic Operations (HTO-20)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-1153

- Office of Highway Safety
Concerned with accident analysis and safety program development and evaluation.
Contact: Howard C. Hanna
Acting Director
Office of Highway Safety (HHS-1)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-2131

- Office of Development
Concerned with implementation of pedestrian facilities and safety programs.
Contact: Milton P. Criswell
Director
Office of Development (HDV-1)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 557-5234

- Office of Research
Concerned with the engineering aspects of pedestrian safety research.
Contact: John C. Fegan
Office of Research (HRS-41)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-9710

- Office of Engineering
Highway Design Division
Environmental and Public Transportation Branch
Concerned with pedestrian accommodation and design of facilities for handicapped persons.
Contact: Ali Sevin
Chief, Environmental and Public
Transportation Branch
Office of Engineering (HNG-25)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-0306

Federal-Aid Division
Concerned with funding for Federal-aid highways and related activities.

Contact: Ed Wood
Chief, Federal-Aid Division
Office of Engineering (HNG-10)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-0442

National Highway Traffic Safety Administration

- **Traffic Safety Programs**

Concerned with pedestrian safety programs and accident data.
Driver and Pedestrian Education Division

Contact: Dr. LeRoy Dunn
Driver and Pedestrian Education
Division
Traffic Safety Programs (NTS-14)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-2180

Pedestrian/Cyclist Branch

Contact: Roger Kurrus
Traffic Safety Programs (NTS-14)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-2180

- **Research and Development**

Concerned with pedestrian research and accident statistics and their analysis.

Contact: Monroe Snyder
Problem-Behavior Research Division
Office of Driver and Pedestrian
Research (NRD-42)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-9591

FEDERAL PROGRAMS

- **Audio-Visual Presentation**

Everyone is a Pedestrian Sometime is the title of a 17-minute slide-cassette presentation developed by the National Highway Traffic Safety Administration. The presentation provides a new look at urban pedestrian accidents from the viewpoint of accident types. It is available from each State's Governor's Highway Safety Representative (see Table 2, p. 39) and the National Audiovisual Center, General Services Administration.

Contact: Orders Section
National Audiovisual Center
General Services Administration
Washington, D.C. 20409
(301) 763-1896
Stock Number: 01-03-25 Price \$33.75

The Federal Highway Administration has produced a 17-minute slide-tape presentation, Pedestrian Safety by Design, that discusses pedestrian traffic accidents and ways to reduce the potential for these accidents through engineering improvements. The program is designed for local highway and traffic departments, safety organizations, and the general public.

Contact: Governor's Highway Safety
Representative in each State
(see Table 2) or,

Federal Highway Administration
Division Office (see Table 3).

- Accident Classification Guidebook

The National Highway Traffic Safety Administration is developing a guidebook that explains how to classify accidents manually or by computer to aid in developing countermeasures. Training materials include a slide-cassette presentation and a workbook. NHTSA is also developing a pedestrian accident reduction guide for use in developing programs at the State and local level.¹⁴

Contact: Roger Kurrus
Traffic Safety Programs (NTS-14)
National Highway Traffic Safety
Administration
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-2180

- Pedestrian Safety Messages

The National Highway Traffic Safety Administration has developed pedestrian safety messages for television and radio. The messages are aimed at both children and adults.

Contact: Roger Kurrus
Traffic Safety Programs (NTS-14)
National Highway Traffic Safety
Administration
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-2180

- Bicycle and Pedestrian Planning Courses

The National Highway Institute offers a technical bicycle planning course and is in the process of developing a pedestrian planning procedures course.

Bicycle Planning Training Course

Contact: Louise Freese
National Highway Institute (HHI-13)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-9143

Pedestrian Planning Procedures Course

Contact: Donna Stickley
State Program Office
National Highway Institute (HHI-13)
400 7th Street, S.W.
Washington, D.C. 20590
(202) 426-9141

¹⁴National Highway Traffic Safety Administration, Pedestrian
Accident Reduction-An Action Guide for State and Local Programs (Draft).

● Planning, Procedures, and Program Manuals

A number of planning, procedures, and program manuals have been developed for the Federal Highway Administration. These reports are described in Chapter 1 and the Annotated Bibliography of this Information Bulletin. When ordering these reports, please use the appropriate PB or U.S. Government Printing Office number. Prices include applicable taxes.

Reports available through National Technical Information Service:

A Pedestrian Planning Procedures Manual by L.S. Kagan, W.G. Scott, and U.P. Avin.

Volume I, Overview, (PB-80-108-79, Price \$11.00).

Volume II, Procedures, (PB-80-108-087, Price \$24.50).

Volume III, Technical Supplement, (PB-108-095, Price \$27.50).

Provisions for Elderly and Handicapped Pedestrians by John Templer

Volume I, Executive Summary, (PB-80-198-591, Price \$6.50).

Volume II, Hazards, Barriers, Problems, and the Law, (Contact NTIS-PB number to be assigned).

Volume III, The Development and Evaluation of Countermeasures, (Contact NTIS-PB number to be assigned).

School Trip Safety and Urban Play Areas by Martin L. Reiss

Volume I, Executive Summary, (PB-254-898, Price \$5.00).

Volume II, Student and Driver Perception of School Trip Safety and Traffic Control Devices, (PB-254-899, Price \$15.50).

Volume III, A Survey of the Characteristics of the Urban Play Street, (PB-254-900, Price \$9.50).

Volume IV, A Review of Daylight Savings Time Related Student Pedestrian Problems and Countermeasures, (PB-254-901, Price \$6.50).

Volume V, Guidelines for the Development of Safe Walking Trip Maps, (PB-254-902, Price \$8.00).

Volume VI, Guidelines For Planning School Bus Routing and Scheduling, (PB-254-903, Price \$8.00).

Volume VII, Operation of Urban Play Streets, (PB-262-422, Price \$9.50).

Contact: National Technical Information
Service

Springfield, Virginia 22161
(703) 487-4650

Reports available through the U.S. Government Printing Office.

Model Pedestrian Safety Program by BioTechnology, Inc., (US GPO Stock Number-050-003 00335-2, Price \$4.50).

The Development of A Priority Accessible Network - An Implementation Manual by John Templer, (US GPO Stock Number-050-001-00163-2, Price \$6.00).

Contact: U.S. Government Printing Office
Document Department
Washington, D.C. 20402
(202) 783-3238

LOCAL PROGRAMS AND CONTACTS

- Dade County

NHTSA has contracted with Dade County to conduct a comprehensive pedestrian safety demonstration project. A public information program includes television and radio spots directed toward certain accident types, a short film for movie theaters, and speaking engagements to senior citizen and other groups. A safe street crossing program is being used in the schools to train children in kindergarten through third grade. Engineering aspects include investigating intersection accidents for the possibility of 50 foot parking setbacks from the crosswalk and bus stop related accidents for the possibility of moving the stop. Some police enforcement is also being used for pedestrian and vehicle violations.

Contact: Miles Moss

Dade County Traffic and
Transportation Department
7100 North 36th Street
Miami, Florida 33166
(305) 592-0830

- Denver

The pedestrian safety program is run by the police department with the aid of a consultant. The program was developed as the result of research on the Denver pedestrian accident problem. The program consists of public information and education, enforcement, and engineering. The police have designed a pedestrian education program for children in kindergarten through the third grade, which is used in all elementary schools. Public service announcements and flyers on pedestrian safety are also used. A three-man police team is in charge of enforcing pedestrian laws. The ticketed pedestrian has the option of paying a fine or attending a two hour pedestrian violation class. Engineering modifications are made at critical intersections where there has been a pedestrian accident problem. Federal funding ended in 1979, but the program has been continued with local funds.

Contact: Detective Tom Heath

Denver Police Department
1331 Cherokee Street
Denver, Colorado 80204
(303) 575-5722

- Nashville

The position of a pedestrian safety advocate has been established in the Mayor's office. The advocate works with various city agencies, such as the police, streets and traffic, and planning, to coordinate pedestrian safety efforts and to educate the public. This includes public service announcements, speaking to community groups, and the development of an elementary school program that is being tested in nine selected schools.

Contact: Jan Hoffman
Pedestrian Safety Advocate
615 Stahlman Building
Nashville, Tennessee 37201
(615) 259-6588

- New York City

New York City's pedestrian safety program can claim success, for in 1979 pedestrian fatalities were the lowest in 50 years. The program includes public service announcements, literature, films, special programs on senior citizens, and a safe route to school program for children. One program teaches retarded individuals to cross streets safely. During the summer certain streets are blocked off, and the Police Athletic League provides recreational activities on these play streets. The City has a policy of providing pedestrian crossings at the expense of reducing vehicle capacity at certain locations.

FHWA has contracted with New York City to study high accident and complex intersections. The results of the study will be used in revising FHWA's Model Pedestrian Safety Users' Manual.

New York City has also applied for a highway safety grant to provide strict enforcement of violations by both vehicles and pedestrians at intersections where a large number of pedestrian accidents have occurred.

Contact: Samuel Schwartz
Assistant Commissioner
New York City Department of
Transportation
51 Chambers Street
New York, New York 10007
(212) 566-2980

- San Francisco

Pedestrian movement is included as part of San Francisco's overall transportation planning. Pedestrian activity areas are given high priority. The City currently has funding from the FHWA Safe Facilities For Pedestrian's Program to create a pedestrian safety plan using FHWA's Model Pedestrian Safety Program Users' Manual. The program includes using accident reports to identify corridors with pedestrian safety problems such as left turn conflicts between automobile and pedestrians. FHWA is funding an in-depth analysis of six corridors for pedestrian safety improvements and will provide funds to implement some of the suggested improvements.

Contact: Alan Lubliner
Center City Circulation Project Manager
San Francisco Department of City Planning
100 Larkin Street
San Francisco, California 94102
(415) 989-4081

● Washington, D.C.

In 1976, a full time pedestrian safety coordinator position was established within the District of Columbia's Department of Transportation. The pedestrian program consists of five major counter-measure efforts: (1) Public Information, (2) School Safety Education, (3) Planning and Management, (4) Enforcement, and (5) Community Participation. Tasks undertaken as part of the program include pedestrian accident analysis and typing; involvement of community groups in identifying neighborhood pedestrian problems; implementation of a prekindergarten through grade 6 school education program; and enforcement of pedestrian and vehicle traffic regulations. Policy decisions made to improve the safety of the pedestrian include restriction of right-turn-on-red, testing of speed bumps in selected residential neighborhoods, changing traffic signal and sign requirements near elementary schools, implementation of selected diagonal parking, and re-evaluation of traffic patterns on major commuters thoroughfares. The pedestrian program is administered by the D.C. Department of Transportation in cooperation and coordination with other District government agencies.

Contact: J.W. Lanum

Pedestrian Safety Coordinator
D.C. Department of Transportation
415 12th St., N.W., Room 604
Washington, D.C. 20004
(202) 727-5777

OTHER PROGRAMS

The American Automobile Association (AAA) offers several programs related to pedestrian safety concerns. Through AAA's Pedestrian Safety Inventory Program, awards are given to local units of government with outstanding pedestrian safety programs and good pedestrian safety records. Last year over 3,000 jurisdictions submitted accident statistics. The AAA reviews these statistics, issues awards, and provides broad recommendations to interested communities as to how their programs might be improved.

The AAA also runs a National Safety Poster Contest for school age children and offers a driver education course that teaches drivers how to be more aware of pedestrians and how to understand pedestrian behavior. The driver education course is used by the U.S. Navy, sales companies, insurance agencies, schools, and local units of government.

Additional information on these programs can be obtained through the local offices of the American Automobile Association, Safety/Public Relations Office.

Chapter 3

ANNOTATED BIBLIOGRAPHY

This bibliography was compiled by the staff of Public Technology, Inc. and endeavors to give a sampling of literature that will be of particular interest to local officials rather than an exhaustive list of all sources of information on the topic.

American Automobile Association. Manual of Pedestrian Safety. Washington, D.C.: AAA, 1964.

This manual provides guidance in setting up a community pedestrian program and looks at engineering, education, legislation, and enforcement as means of reducing pedestrian accidents. Although somewhat outdated, it provides good background information.

Berger, W.G. and R.L. Knoblauch. Urban Pedestrian Accident Countermeasures Experimental Evaluation. Prepared for NHTSA and FHWA by BioTechnology, Inc., Washington, D.C.: U.S. Department of Transportation, 1975.

This two volume report focuses on the determination of the effectiveness of nine safety countermeasures. A series of behavioral studies was conducted in eight cities to determine the extent to which the proposed countermeasures inhibit undesirable vehicular and pedestrian behaviors.

BioTechnology, Inc. Model Pedestrian Safety Program Users' Manual. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1978.

The Manual provides guidelines and resource information for the development or improvement of local pedestrian safety programs. It identifies steps to follow to set up a pedestrian safety program and provides information to help select safety countermeasures. It lists numerous possible solutions to safety problems and provides lists of additional references.

BioTechnology, Inc. Urban Intersection Improvements for Pedestrian Safety. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1977.

This five volume report identifies the safety and operational problems associated with the interaction of pedestrians and vehicles at intersections, analyzes various kinds of signals with regard to their display and timing, evaluates specific pedestrian signal devices, and develops and analyzes alternatives to full signalization at intersections.

- Blomberg, Richard D., James C. Fell, and Theodore Anderson. A Comparison of Alcohol Involvement in Pedestrians and Pedestrian Casualties. Washington, D.C.: U.S. Department of Transportation, National Highway Traffic Safety Administration, 1979.

This report examines a study conducted in New Orleans to determine the relationship of alcohol consumption by adult pedestrians to pedestrian accident rates. Various accident types and pedestrian behaviors were examined. Blood alcohol concentrations were found in approximately one-half of the fatally and non-fatally injured pedestrians studied.

- Blomberg, Richard D. and David F. Preusser. Identification and Test of Pedestrian Safety Messages for Public Education Programs. Prepared for NHTSA. Washington, D.C.: U.S. Department of Transportation, 1975.

A review of the literature and data from pedestrian accident research studies was used as input to an analysis that developed fourteen messages directed at specific pedestrian accident problems. Seven of the messages were pretested to measure behavioral change, and it was concluded that public education can influence pedestrian behavior and is therefore a useful countermeasure to pedestrian accidents.

- Davis, David I. and Lawrence A. Pavlinski. "Improving Prospects for Pedestrian Safety". Traffic Quarterly. (July, 1978).

The article discusses the National Highway Traffic Safety Administration and the Federal Highway Administration approaches to pedestrian safety and includes examples of the type of research and programs that are currently going on.

- DeBartolo, Karen B., David F. Preusser, and Richard D. Blomberg. Enforcement Frequency, Sanctions and Compliance Level for Pedestrian Safety. Prepared for NHTSA by Dunlap and Associates. Washington, D.C.: U.S. Department of Transportation, 1978.

One proposed pedestrian safety countermeasure is parking bans for specific times at high risk locations. The purpose of the study was to investigate the effect of enforcement on such parking bans. The results showed that increased enforcement can lead to improved motorist compliance. Recommendations are offered for employing and enforcing time-phased parking bans.

- Freeman, M. et al. Fixed Illumination for Pedestrian Protection. Final Report. Prepared for the Federal Highway Administration. Washington, D.C.: U.S. Department of Transportation, 1975.

This study investigates the effectiveness of specially designed low pressure sodium luminaries in increasing pedestrian safety at intersecting crosswalks at night. It was found that they had beneficial effects on the crossing environment, driver performance, and pedestrian behavior.

Great Britain, Department of the Environment. Pedestrian Safety.
London: Her Majesty's Stationary Office, 1973.

This manual is the outcome of a comprehensive study undertaken for the Department of Environment. It is designed to help any organization whose business is pedestrian safety by bringing together a description of the range of facilities available backed by advice and criteria for implementation.

Habib, Phillip A. Analysis of Pedestrian Accidents on One-Way Street Networks. Prepared for the Office of University Research.
Washington, D.C.: U.S. Department of Transportation, 1978.

This report identified unique causal factors controlling accidents experienced on crosswalks of intersections of one-way street networks. One question addressed is why left-turning vehicles are at least twice as likely to strike a pedestrian in a crosswalk as right-turning vehicles.

Hale, A., R.D. Blomberg, and D.V. Preusser. Experimental Field Test of the Model Ice Cream Truck Ordinance in Detroit. Prepared for NHTSA.
Washington, D.C.: U.S. Department of Transportation, 1978.

The Model Ice Cream Truck Ordinance (MICTO) is designed to prevent child pedestrian accidents from occurring near ice cream trucks. Among other things, the MICTO requires motorists to stop before passing an ice cream truck displaying the special swing arm and flashing lights which must be actuated when the truck is stopped to vend. The MICTO was enacted by the City of Detroit on May 12, 1976, and became fully effective on June 10, 1976. A two year field test of the safety-effectiveness of the MICTO showed a reduction in motorist speeds and a 77% reduction in vendor-related, child pedestrian accidents.

Hauck, J. "Well-Marked Crosswalks are a Pedestrian's Best Friend."
Rural and Urban Roads (March 1979).

This paper discusses a study conducted in Peoria, Illinois, to determine the benefits of well-marked pedestrian crosswalks. The operational effectiveness of well-marked crosswalks was determined by comparing pedestrian and motorist observance of worn crosswalks with observance after these crosswalks were remarked. It was concluded that there was significant increase in pedestrian motorist observance of crosswalks at 17 combined locations in the Peoria area after re-marking of crosswalks at these locations.

Hermes, B.F. "Pedestrian Crosswalk Study: Accidents in Painted and Unpainted Crosswalks." Highway Research Record 406. "Pedestrian Protection." Washington, D.C.: Transportation Research Board, 1972.

This reports on a study of pedestrian accident experience at unsignalized intersections. In general, twice as many pedestrian accidents occurred in marked crosswalks as in unmarked crosswalks.

Kagan, L.S., W.G. Scott and U.P. Avin. A Pedestrian Planning Procedures Manual. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1978.

Three volumes. Volume I, Overview, Volume II, Procedures, Volume III, Technical Supplement.

The Manuals describe the processes and procedures involved in planning and evaluating comprehensive pedestrian planning systems and individual pedestrian facilities. Volume II describes the procedures in two phases: demand modelling and evaluation. Volume III provides detailed information on the data and methodologies used in the study.

Knoblauch, Richard L. Causative Factors and Countermeasures for Rural and Suburban Pedestrian Accidents: Accident Data Collection and Analysis. Washington, D.C.: U.S. Department of Transportation, National Highway Traffic Safety Administration and Federal Highway Administration, 1977.

This report and the accompanying appendices document a study of pedestrian accident types in rural and suburban areas. The study examined site characteristics and pedestrian behavior as related to various accident types. Twenty-three accident types were identified, but six types represented 60% of the accidents sampled. Countermeasures are discussed.

Knoblauch, R.L., W. Moore, Jr., and P.R. Schmitz. Pedestrian Accidents Occurring on Freeways: An Investigation of Causative Factors, Accident Data Collection and Analysis. Volumes I-III. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1978.

This report documents a study of freeway pedestrian accidents. Site characteristics, pedestrian, driver, and vehicular factors were examined. Countermeasures for fourteen types of accidents were discussed. Because of the infrequency of these accidents, less than 1,000 nationwide annually, and the variety of causal factors involved, the study recommends that countermeasures be applied on a site-by-site basis.

National Highway Traffic Safety Administration. Highway Safety Program Manual. Volume 14. Pedestrian Safety. Washington D.C.: U.S. Government Printing Office, 1974.

Volume 14 discusses Standard 14, the purpose of which is to include pedestrian safety as an integral element in community planning and all aspects of highway transportation and to ensure a continuing program to improve pedestrian safety by each State and its political subdivisions. Standard 14 is one of 18 Highway Safety Program Standards authorized under authority of the Highway Safety Act of 1966.

National Highway Traffic Safety Administration. Pedestrian Accident Reduction. An Action Guide for State and Local Programs. (Draft) Washington, D.C.: U.S. Department of Transportation, 1980.

The Guide presents a systematic approach to the pedestrian accident problem. The approach is based on grouping identified accident types and can be used in developing pedestrian safety programs at the State and local level. Various aspects of starting a new pedestrian safety program or modifying an existing one are discussed. Descriptions of accident types and countermeasures are included.

National Highway Traffic Safety Administration. Pedestrians: A Subject Bibliography from Highway Safety Literature. Washington, D.C.: U.S. Department of Transportation, 1977. (NTIS: DOT-HS-802-504).

This bibliography includes pedestrian-related literature acquired by the National Highway Traffic Safety Administration since its establishment in 1967.

Orcutt, Fred L. and Hollins A. Walker, Jr. "Traffic Engineering for Pedestrian Safety." Transportation Engineering. (January 1978).

The article discusses the two major aspects of a pedestrian safety program: administrative provisions and traffic engineering design provisions. Regulations or procedures should be established to provide the city traffic engineer or other responsible official with the necessary authority to administer and enforce the following in a pedestrian safety program: subdivision regulations; parking lot design regulations; sidewalk placement and design regulations; on-street parking control at pedestrian crossings; and periodic review of pedestrian generators and attractors. Three areas of concern have been identified within traffic engineering design provisions for pedestrian safety: geometric signing, pavement markings, and signalization.

Reiss, Martin L. School Trip Safety and Urban Play Areas. Prepared for FHWA. Washington, D.C.: U.S. Department of Transportation, 1975.

This seven volume report presents guidelines for the protection of young pedestrians (5-14 years of age) while they are walking to and from school, entering and leaving school buses, and playing in their neighborhoods, and includes two volumes on urban play streets. In addition, it studies student and driver perception of trip safety and traffic control devices and evaluates daylight saving time as it relates to safety issues.

Smith, Steven A. "A Plea for Consistency in Pedestrian Signal Timing." ITE Journal (November 1978).

The author discusses the correlation between signal timing and pedestrian compliance with pedestrian signals during the clearance interval.

Snyder, M.B. and R.L. Knoblauch. Pedestrian Safety: The Identification of Precipitating Factors and Possible Countermeasures. Two volumes. Prepared for NHTSA. Washington, D.C.: U.S. Department of Transportation, 1971. (NTIS PB 197-749, 750)

The study objective was to identify causes and countermeasures relevant to pedestrian accidents. Behavioral and descriptive data were collected for over 2,000 pedestrian accidents in 13 major cities. Cases were divided into accident types on the basis of causal factors and target groups to provide a basis for countermeasure identification.

Swan, S. and C. Sgourakis. Effective Treatments of Over and Under Crossings for Use by Bicyclists, Pedestrians, and the Handicapped. Literature Review. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1980.

This report includes an analysis of readily available literature on the subject and information about recent experiences in planning, designing, and constructing crossing facilities.

Templer, John et al. Development of Priority Accessible Networks-An Implementation Manual. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1980.

This report provides guidelines for the design and development of accessible routes for elderly and handicapped pedestrians. The Manual includes a sequence of decision making steps from problem identification through project implementation for planning accessible networks. Design details are provided for recommended solutions to major problems experienced by elderly and handicapped pedestrians.

Templer, John. Provisions for Elderly and Handicapped Pedestrians. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1979.

Three volumes. Volume I, Executive Summary; Volume II, Hazards, Barriers, and the Law; and Volume III, The Development and Evaluation of Countermeasures.

Volumes I-III examine the problems and hazards experienced by elderly and handicapped pedestrians and countermeasures for reducing or eliminating these problems.

Transportation Research Board. Transportation Research Record 540. "Urban Accident Patterns." Washington, D.C.: Transportation Research Board, 1975.

This features a series of articles on facets of pedestrian safety including intersection control, pedestrian visibility at night, and suburban pedestrian attitudes and behavior.

Transportation Research Board. Transportation Research Record 629.
"Pedestrian Controls, Bicycle Facilities, Driver Research, and System
Safety." Washington, D.C.: Transportation Research Board, 1977.

The volume includes a series of papers on pedestrian signals and
their relationship to safety and accident data.

Transportation Research Board. Transportation Research Record 683. "Road
User Information Needs, Pedestrian Movement, and Bicycle Travel
Patterns." Washington, D.C.: Transportation Research Board, 1978.

This collection of 12 papers dealing with signing, pedestrians, and
bicyclists was presented at the 57th annual meeting of the
Transportation Research Board.

U.S. Department of Transportation. National Highway Traffic Safety
Administration. Pedestrian-Bicycle Safety Study. Washington, D.C.:
GPO, 1975.

The study summarizes findings and recommendations useful in the
development and implementation of pedestrian and bicyclist related
policies and programs. It includes findings and recommendations in
the areas of laws and ordinances and enforcement policies and
practices, alcohol involvement, ways and means of improving programs,
and funding allocations and program capabilities.

Young, Mary E. ed. Pedestrian Movement and Safety. A Bibliography with
Abstracts. Springfield, Va.: National Technical Information Ser-
vice, 1978.

Reports on the movements of pedestrians and techniques for their pro-
tection in traffic systems are cited. Pedestrian safety standards,
accidents involving pedestrians, and construction and traffic design
related to pedestrian movement and safety are included. This updated
bibliography contains 173 abstracts, 25 of which are new entries to
the previous edition.

Zador, Paul. Adoption of Right-Turn-on-Red: Effects on Crashes at
Signalized Intersections. Washington, D.C.: Insurance Institute for
Highway Safety, 1980.

The effect of Congressionally mandated right turn on red laws on the
frequency of accidents is examined in this report. The report con-
cludes that the widespread and indiscriminate adoption of these laws
is in conflict with Congress's intent of adopting the laws only to
"the maximum extent practicable consistent with safety."

APPENDIX

FEDERAL FUNDING SOURCES FOR PEDESTRIAN SAFETY PROGRAMS

Funds from all of the the following programs can be used for appropriate pedestrian facilities or pedestrian safety and research programs. Most of the programs are administered by FHWA through the State highway agency. Further information on the programs can be obtained from NHTSA or FHWA offices in Washington, the FHWA Division office located in each State, or the State highway agency.¹⁵

FEDERAL HIGHWAY ADMINISTRATION

Federal-aid system apportionments may be used for the construction of exclusive bus lanes, highway traffic control devices, bus passenger loading areas and facilities, and fringe and transportation corridor parking to serve mass transportation passengers. Limitations: Maintenance work is not included in these programs.

● INTERSTATE PROGRAM

Purpose: To connect the principal metropolitan areas, cities and industrial centers by routes as directly as possible and to serve the national defense.

Eligible Activities: Design, right-of-way acquisition, and construction of Interstate highways including pedestrian facilities associated with the Interstate System.

Limitations: Projects must be on the Interstate System, which is limited to 42,500 miles.

Eligibility Requirements: The program is administered by the State highway agency.

Federal Participation: 90%

● PRIMARY PROGRAM

Purpose: To develop an adequate system of connected main roads important to Interstate, Statewide, and regional travel.

Eligible Activities: Design, right-of-way acquisition, and construction of projects on the Federal-aid Primary System including pedestrian facilities associated with the Primary System.

¹⁵Federal Highway Administration, Your Guide to Programs of the Federal Highway Administration, Washington, D.C.: U.S. Department of Transportation.

Eligibility Requirements: These programs are administered by the State highway agency. Local governments may participate in project selection through the State highway agency.

Federal Participation: 75%

● URBAN PROGRAM

Purpose: To improve service to the major centers of activity within urbanized areas and in such other urban areas as the State highway agency may designate.

Eligible Activities: All construction improvements, on the urban system routes and parking facilities, auto free zones, modernized traffic signal systems, preferential bus lanes, channelization, bus loading areas and facilities, and grade separations for pedestrians, highways, or railroads.

Limitations: Except for the transit improvements, projects must be located on the Federal-aid urban system.

Eligibility requirements: Routes on the Federal-Aid Urban System shall be designated by appropriate local officials with the concurrence of the State highway agency. Projects shall be selected by the appropriate local officials with the concurrence of the State highway agency. In urbanized areas, route designation and project selection shall be in accordance with the planning process required pursuant to Title 23, Section 134.

Federal Participation: 75%

● SECONDARY PROGRAM

Purpose: To assist State and local rural governments in the improvement of the Federal-Aid Secondary Systems.

Eligible Activities: Preliminary engineering, right-of-way acquisition and relocation, and construction costs are eligible activities.

Limitations: This program is limited to projects on the Federal-Aid Secondary System that are rural, major collector routes. Federal funds are made available to the States on the basis of land area, rural population, and rural road mileage. Each of these criteria is weighted equally. The funds are suballocated by the State to local officials. Approximately 50% of these funds are used on rural county roads that constitute a little over one-half of the total 400,000 miles of rural secondary roads. These funds are available for State and local use for 3 years after the year that the apportionment is made.

Eligibility Requirements: Secondary road projects must be selected cooperatively by the State highway agency and the appropriate local officials, except in those States where all public roads and highways are under the sole control of the State highway agency.

Federal Participation: 75%

● BIKEWAYS AND PEDESTRIAN WALKWAYS PROGRAM

Purpose: To promote safety and assist in retaining the motor vehicle carrying capacity of the highway while adding new bicycle capacity.

Eligible Activities: Bicycle and pedestrian facilities may be constructed as incidental features of highway construction projects where construction is concurrent and normal highway right-of-way is utilized. Independent bikeways or walkways may be constructed on completed sections of Federal-aid highways. Eligible costs may include: (a) grading, drainage, paving, barriers, landscaping, and necessary structures; (b) supplementary facilities such as shelters, parking, bicycle storage, and comfort stations; (c) traffic control devices; (d) fixed source lighting where appropriate; (e) curb-cut ramps on new and existing facilities; (f) right-of-way; (g) walks, barriers, and additional widths and lengths on bridges necessary for route continuity; and (h) grade separations under certain conditions. The amount to be expended annually on independent facilities, bikeways, and walkways is limited to \$2.5 million per state and \$45 million nationally. There are no limits on facilities constructed as incidental features of highway construction projects.

Limitations: Independent bikeway or walkway projects may be on the Federal-Aid Primary System, Secondary System, and the Urban System. It must be determined that: (a) the facility will not impair the safety of the motorist, bicyclist, or pedestrian; (b) the facility will form a segment of an overall plan; (c) a public agency agrees to maintain and to ban all motorized vehicles other than maintenance vehicles or snowmobiles; and (d) there is reasonable expectation that use will justify the cost.

Eligibility Requirements: The program is administered through the State highway agency; however, local initiative is encouraged on a project-by-project basis.

Federal Participation: Eligible for funding at the same matching as usual for the class of funds except that independent facilities on the Interstate System are funded as primary or urban extension projects.

● HIGHWAY PLANNING RESEARCH AND DEVELOPMENT PROGRAM

Purpose: To enable State highway agencies to conduct, or have conducted for them, studies that will help them plan, design, construct, operate, and maintain highways and highway systems more efficiently and cost effectively. Transportation plans, needs, and improvement programs may be prepared for an entire State or for smaller geographical areas covering one or more governmental jurisdictions.

Eligible Activities: Studies which seek more complete knowledge of the basic characteristics of the geometry, traffic flow and safety, structural capabilities, material usage, economics, financing, and administration of highway systems and their effectiveness within the total transportation system may be included in the program. The translation of the findings of these studies into materials, devices, or techniques for the practical solution of specific problems in highway transportation are also eligible. Transportation planning studies or activities which contribute to the development of transportation plans and programs are eligible items. These include, but are not limited to, the following: (a) preparing highway maps (county, city, and State); (b) making on-site inspections to determine the physical condition of highways; (c) determining the number, weight, and speeds of automobiles and trucks traveling particular highways; and (d) making traffic surveys to determine where traffic desires to travel (origin-destination studies).

Limitations: Once a new material, device, or technique has been studied and its use proven to be either feasible or not, further studies of it are generally no longer eligible for inclusion in the program. Highway planning funds cannot be used to prepare construction plans; for purchasing rights-of-way; or for actual construction of transportation facilities. Likewise, the operation and maintenance of highway facilities may not be included.

Eligibility Requirements: The State is responsible for administering this program through its State highway agency. Arrangements may be made, however, to permit local governments or private organizations to participate in the program.

Federal Participation: 70% for planning research,
90% for highway planning research

● FEDERAL-AID METROPOLITAN PLANNING PROGRAM

Purpose: The purpose of this program is to assist in the implementation of a continuing, cooperative, and comprehensive transportation planning process that results in plans and programs consistent with the comprehensively planned development of the urbanized area. Certification of this process is a prerequisite for Federal-aid program approvals.

Eligible Activities: Transportation planning studies of activities that contribute to developing and maintaining the planning process are eligible activities. These include: (1) activities that contribute to the improved efficiency of the existing transportation system, (2) activities that provide for the short-range transportation needs, and (3) activities that identify new transportation policies and transportation facilities or major changes in existing facilities.

Limitations: Metropolitan planning funds cannot be used to prepare construction plans used for building highways, for the purchase of highway rights-of-way, or for the actual construction of highways. All planning activities are accomplished prior to the highway design phase.

Eligibility Requirements: The State, through its State highway agency, is responsible for the administration of funds made available by this program. However, the State must make these funds available to the metropolitan planning organizations (MPOs) which are designated by the Governor to be responsible for the 3-C planning process in each of the urbanized areas. In States where no urbanized areas exist, the State shall expend the funds for urban transportation planning in small urban areas (5,000 to 50,000 population). Through arrangements with the MPO, private organizations or other local governments may participate in this program.

Federal Participation: 80%

● SAFER OFF-SYSTEM ROADS PROGRAM

Purpose: To enable the States and local road officials to construct, reconstruct, or otherwise improve off-system roads (including bridges) with special emphasis on projects that contribute significantly to the safety of the traveling public.

Eligible Activities: Any road that is not on a Federal-aid highway system is eligible for construction or improvement under this program. Because funds are limited compared to needs, selected projects should be, where feasible, low-cost projects such as correction of high-hazard locations, elimination of roadside obstacles, bridge widening, and installation or upgrading of traffic control devices.

Limitations: Funds may not be used for the following: (a) toll roads, (b) roads that are unavailable for public travel, and (c) roads which are under the jurisdiction of, and maintained by, some entity other than a public authority. Not less than 50% of each State's obligation shall be used for highway safety improvement projects.

Eligibility Requirements: The State highway agency distributes the available funds throughout the State, both on and off the State-system, and cooperates with local road officials in the selection of projects in a manner that maximizes the use of funds available under this program.

Federal Participation: 70%

● HAZARD ELIMINATION PROGRAM

Purpose: To reduce hazards on the Federal-aid system that have high accident experience or potential.

Eligible Activities: Eligible activities include projects for the improvement of identified high-hazard locations including roadside obstacles which constitute a danger to vehicles or pedestrians. These projects may include, but are not limited to, the following: (a) intersection improvements, (b) modification of roadway cross sections, (c) pavement skid treatments, (d) alignment changes, and (e) removal of roadside obstacles within 30 feet of the traveled way.

Limitations: It is not anticipated that major reconstruction of appreciable lengths of highway will qualify for funding under this program. These projects can be on any Federal-aid system other than the Interstate System.

Eligibility Requirements: The program is administered by the State highway agency; however, local governments may participate by working with the State.

Federal Participation: 90%

● PAVEMENT MARKING DEMONSTRATION

Purpose: To demonstrate the value of pavement markings in providing greater vehicle and pedestrian safety.

Eligible Activities: The costs of materials, labor, equipment rental, or depreciation charges necessary to apply pavement markings are eligible items, as are the costs of renewing such markings, if necessary, to enable their effectiveness to be evaluated over a period of two years. Higher quality pavement markings may be applied to sections previously marked if it can be demonstrated this will increase safety to the traveling public. Also eligible are the data collection, analysis, and evaluation activities carried out under this program.

Limitations: Except as noted above for higher quality markings, pavement marking funds are not eligible to pay the cost of renewing markings that were not applied under this program and that conform

to the standards set forth in the Manual on Uniform Traffic Control Devices.

Eligibility Requirements: Any paved public highway except those on the Interstate System are eligible for pavement marking projects. The program is administered by the State highway agency; however, local initiative is encouraged for projects on highways under local jurisdiction.

Federal Participation: 100%

● **FEDERALLY COORDINATED PROGRAM OF RESEARCH AND DEVELOPMENT**

Purpose: To conduct, or to have conducted, research and development studies to increase the effectiveness of the Nation's highway system while achieving a concurrent improvement in safety and environmental compatibility and a reduction in highway costs and energy consumption.

Eligible Activities: Program provides for the following: (a) Federal-aid to State highway agency research and development programs and studies, (b) Federal contracts for FCP studies, (c) FHWA staff research, and (d) fellowships in highway safety. Research and Development studies may be funded which promise to increase performance, enhance safety, improve environmental compatibility, conserve energy, or reduce costs. New studies may address a new subject area or may extend, modify, or refine previous work in a subject area.

Limitations: Research and Development studies that duplicate other work are not eligible for funding. In addition, the physical design, construction, operation, and maintenance of highway facilities are not eligible under the program.

Eligibility Requirements: The State highway agencies are the eligible recipients of the Federal-aid funds. They may participate by developing an annual work program with which they establish a framework and total budget for the year. Individual research and development studies may be initiated by the agency at any time during the year as long as these will fit within the budget of the annual program. Both the annual program and individual studies are submitted to the local FHWA Division Administrator for approval by the appropriate FHWA office. Local agencies and private entities or individuals, universities, and colleges may participate through contractual arrangements with State highway agencies.

FHWA is authorized to use other Federal Research and Development funds either independently or in cooperation with other Federal agencies to contract with State or local agencies, institutions, or individuals.

Federal Participation: 100%

FEDERAL HIGHWAY ADMINISTRATION AND NATIONAL HIGHWAY TRAFFIC SAFETY
ADMINISTRATION

● STATE AND COMMUNITY HIGHWAY SAFETY PROGRAMS

Purpose: To reduce traffic accidents and deaths, injuries, and property damage resulting therefrom by implementing the highway safety standards and conducting safety research.

Eligible Activities: This program provides for the following: (a) accident location reference systems, (b) training, (c) traffic engineering services, (d) warning and regulatory signs off the Federal-aid system, (e) skid resistance inventories, (f) bridge inventories, (g) equipment purchases, (h) public information activities, (i) design manuals, and (j) impact attenuator replacement parts.

Limitations: With minor exceptions, Section 402 prohibits the expenditure of safety funds for ". . . (1) highway construction, maintenance, or design (other than design of safety features of highways to be incorporated into standards) or (2) any purpose for which funds are authorized by Section 403 of Title 23. . . ."

Eligibility Requirements: Activities must be programmed and approved in a State's Annual Highway Safety Program, which is administered by the Governor's Highway Safety Representative.

Federal Participation: 75%

● HIGHWAY SAFETY RESEARCH AND DEVELOPMENT PROGRAM

Purpose: To carry out safety research and development.

Eligible Activities: Program provides for activities such as: (a) training or education of highway safety personnel; (b) research fellowships in highway safety; and (c) highway safety research.

Limitations: Activities are primarily administered by FHWA and NHTSA Headquarters Office with support from the field offices.

Eligibility Requirements: Funds are used either independently or in cooperation with other Federal departments or agencies for contracting with State or local agencies, institutions, and individuals. Grants are made for highway safety research fellowships.

Federal Participation: 100%

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Table 3

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*Hawaii includes American Samoa and Guam.

**To place calls to overseas areas, Dial 9 (from federal agencies) and 0 for overseas operator--provide operator with country, city, and telephone number.

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Pedestrian :

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SPECIAL ACKNOWLEDGEMENTS

Public Technology, Inc.



Department of Transportation



Public Technology acts as Secretariat to the Urban Consortium. The UC/PTI Transportation Project consists of the following PTI staff and consultants:

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